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[54] **FILTER FOR LIQUIDS, IN PARTICULAR INTERNAL-COMBUSTION ENGINE LUBRICANT OILS**

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[52] **U.S. Cl.** **210/130**; 210/136; 210/232; 210/437; 210/438; 210/450; 210/455; 210/457; 210/493.2

[58] **Field of Search** 210/437, 440–444, 210/450, 455, 457, 493.2, 130, 132, 136, 232, 438

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Primary Examiner—Matthew O. Savage
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[57] **ABSTRACT**

A filter for liquids is disclosed herein. The filter includes a filter housing containing an exchangeable filter element. A support part is provided within the housing that is separable from the at least one filter element and extends at least partly centrally through the interior space of the filter element. A means is provided for releasably attaching one end of said support part to the filter housing. The housing includes first and second radial inner seals for separating a crude space surrounding an exterior of the filter element from a clean space located within interior of the filter element with the radial inner seals being mounted within the housing at the axial ends of the filter element. The filter element is folded star-shaped and sealed on the face side and provided on the inside at each of its two axial ends with a sleeve having an interior portion resting against the radial inner seals. The first radial seal includes an extension portion contained within a groove formed in the support part for separating the crude space from the clean space. An overflow valve is contained within the support part for establishing a flow connection between said crude space and said interior space when a pressure difference therebetween exceeds a predetermined value.

21 Claims, 5 Drawing Sheets

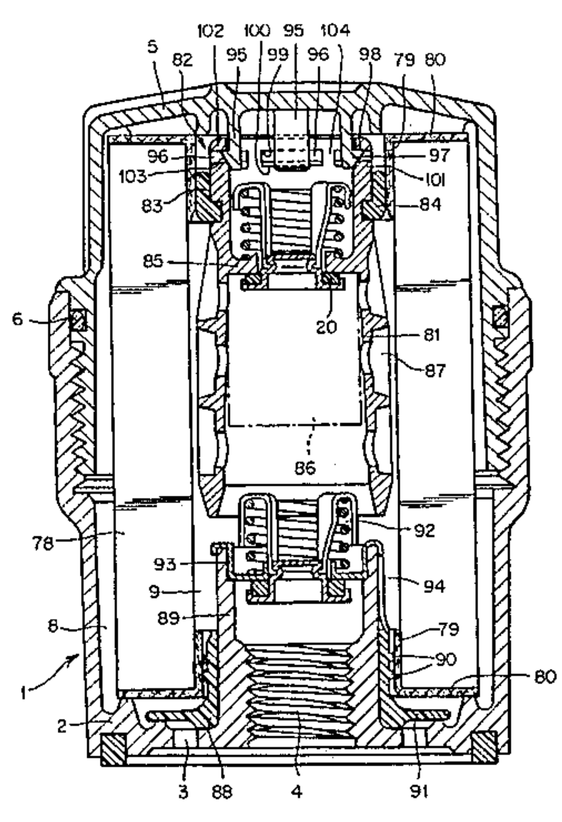

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FIG. 1

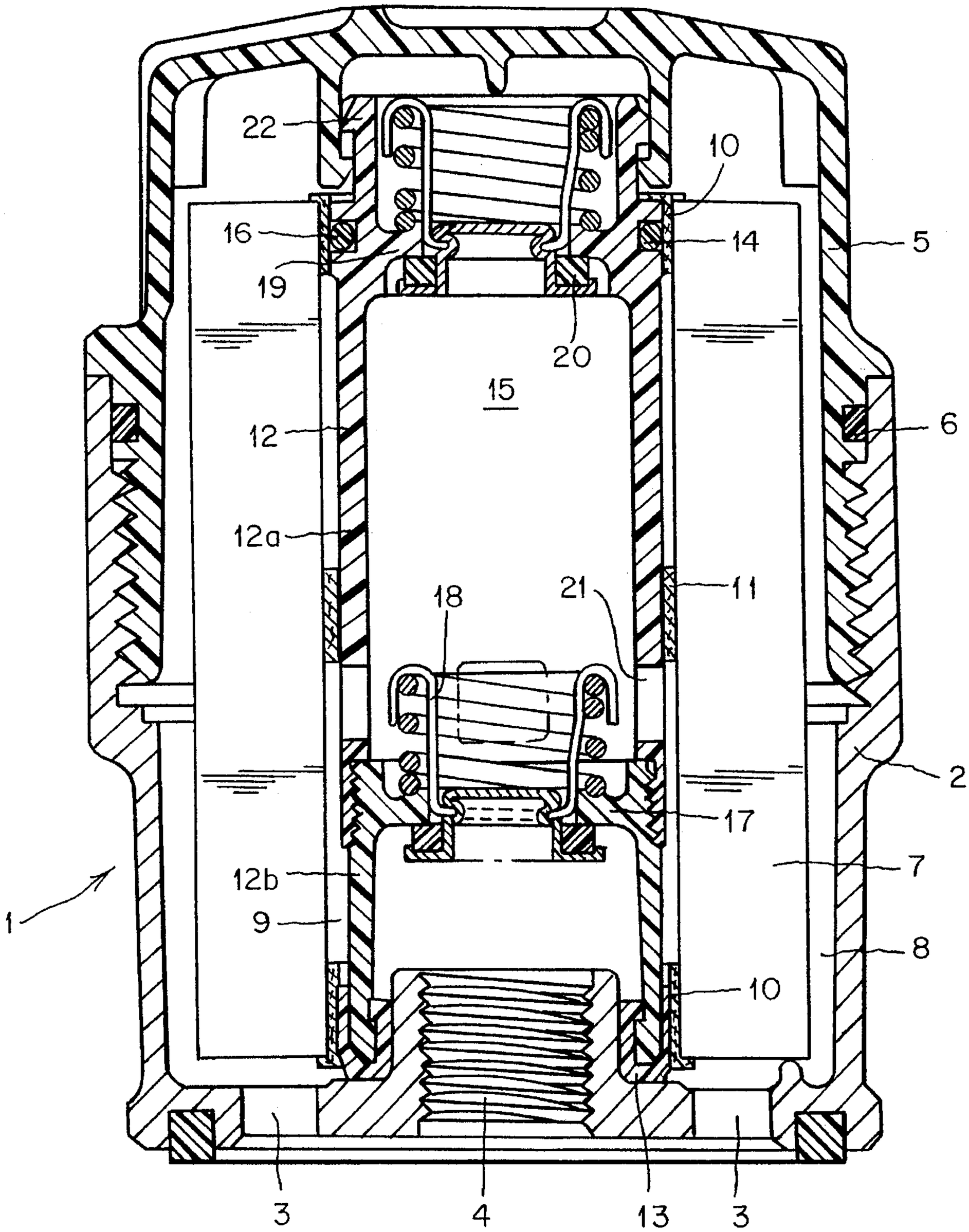

FIG. 2

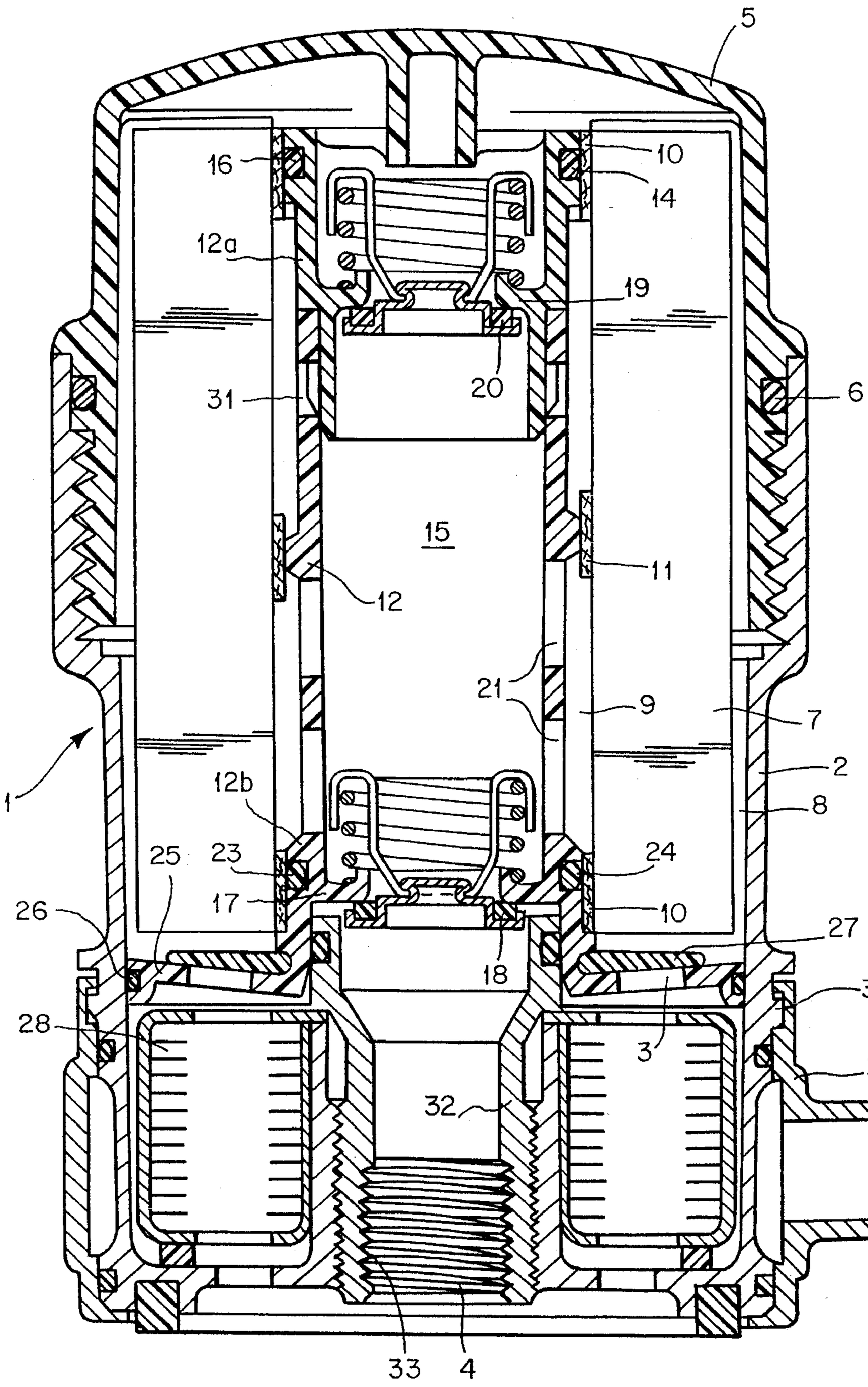
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FIG. 3

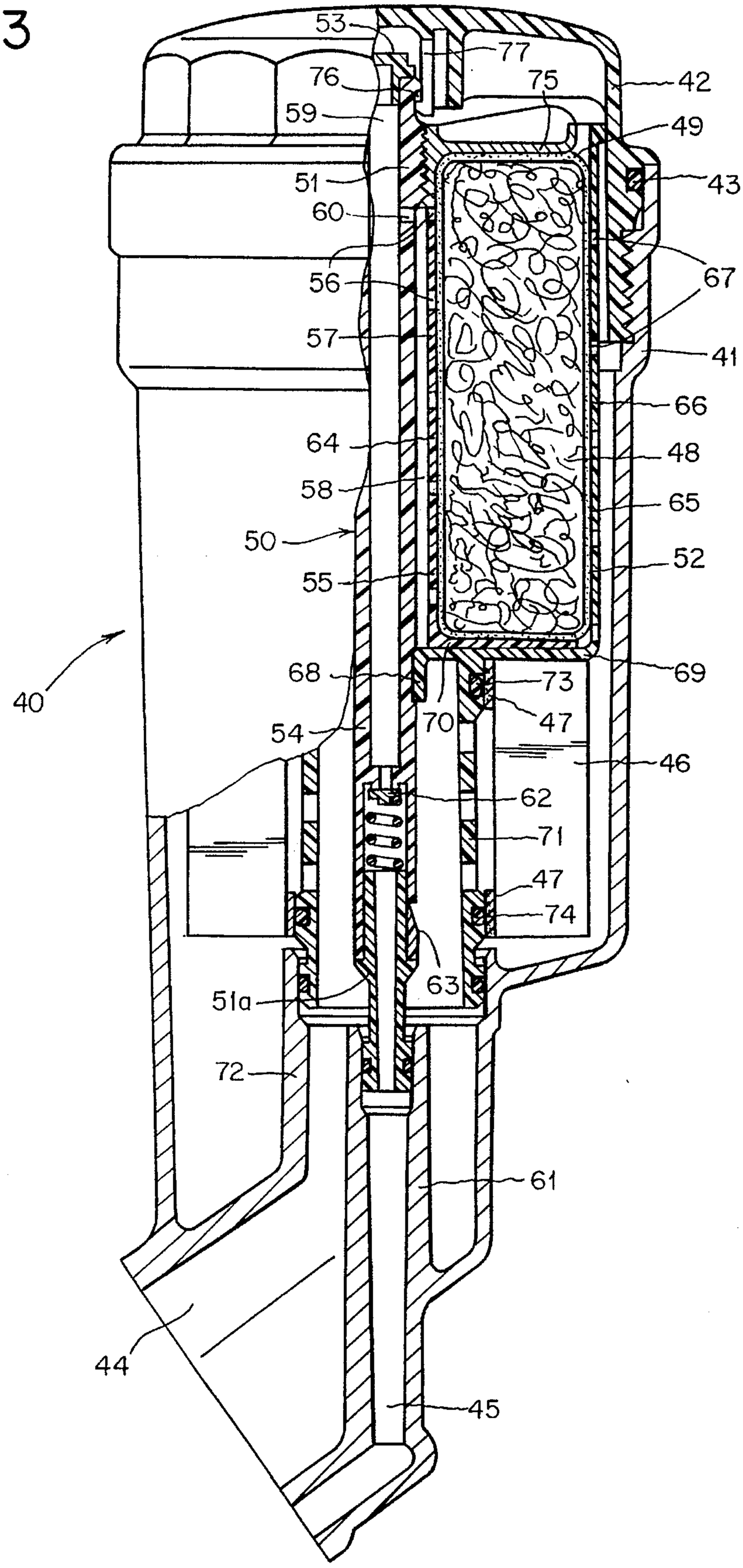
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FIG. 4

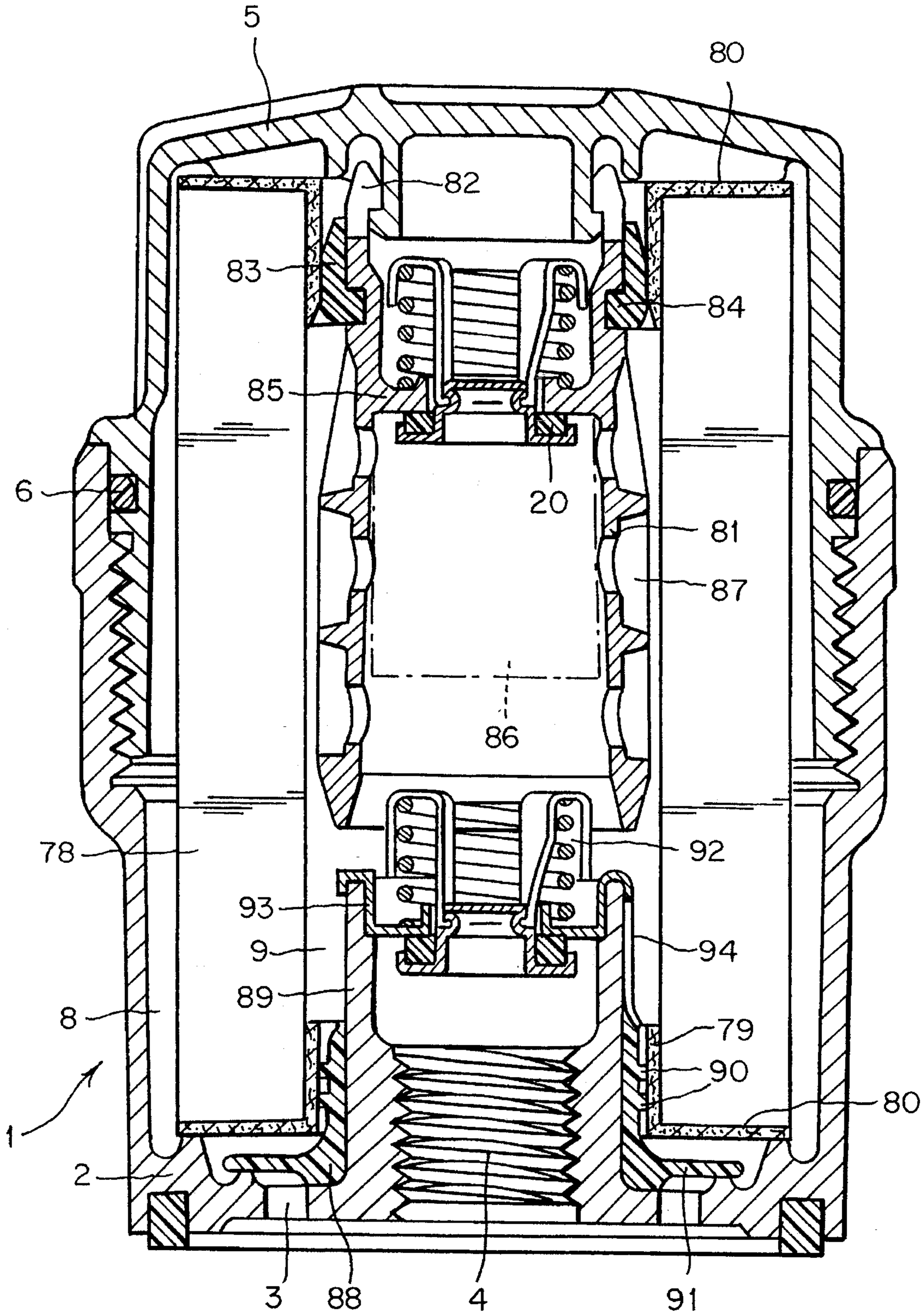
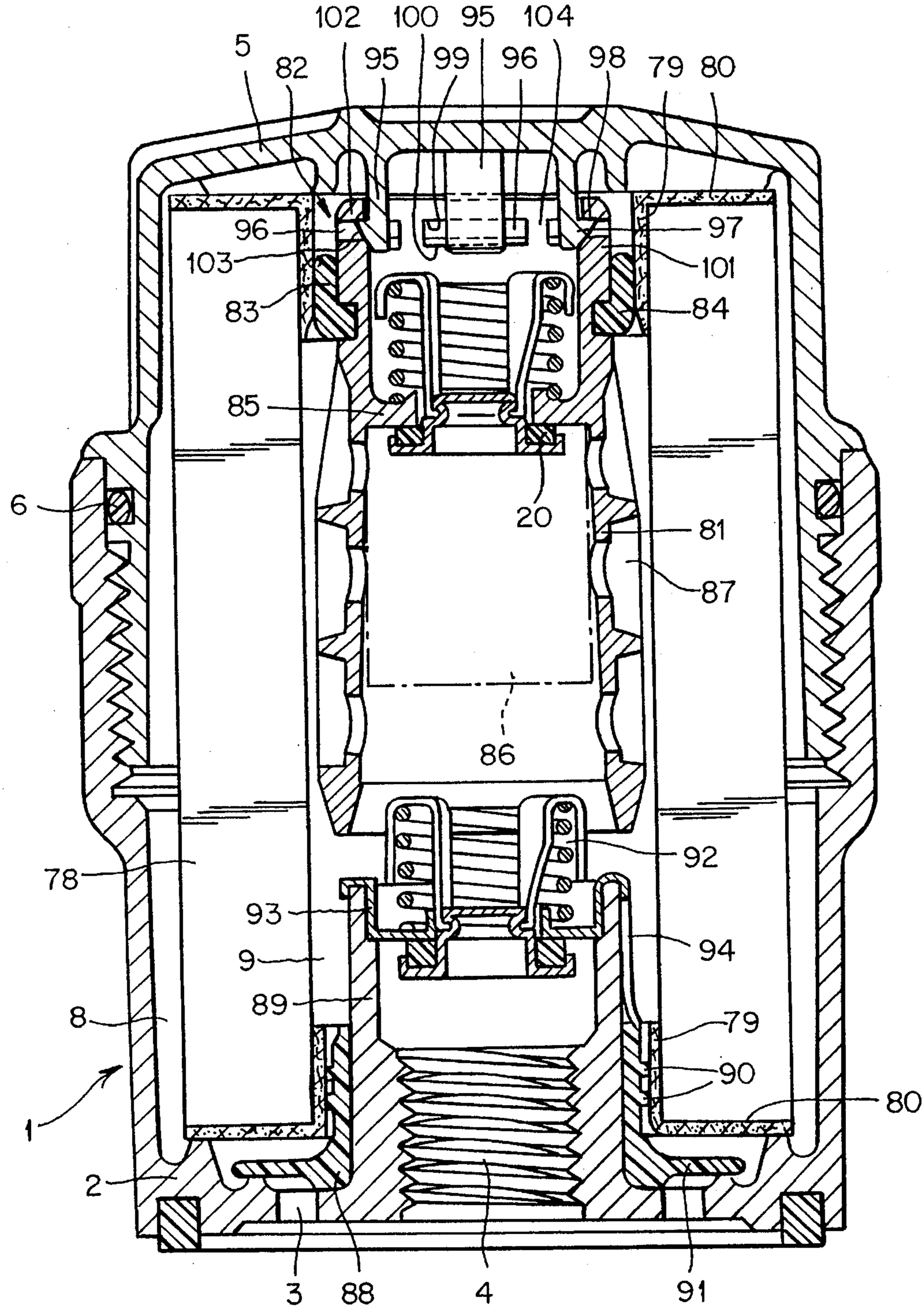


FIG. 5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FILTER FOR LIQUIDS, IN PARTICULAR INTERNAL-COMBUSTION ENGINE LUBRICANT OILS

The invention relates to a filter for liquids, in particular a lubricating-oil filter for an internal-combustion engine according to the introductory part of claim **1**.

Such a filter for liquids is known, for example from U.S. Pat. No. 3,333,703. The filter for liquids shown there consists of a pot-shaped filter housing which, at its one end, is connected with a mounting head via a screw thread, and provided at its other open end with a screw-on housing cover. A filter element supported in the interior of the filter housing is provided with end disks and separates the crude space from the clean space. On the end disk of the filter element disposed opposite the housing cover, an overflow valve is mounted which, under certain operating conditions, establishes a connection between the crude space and the clean space. In connection with the other end disk of the filter element and the closed end of the filter housing, provision is made for a return check valve. A drawback with said design is, on the one hand, the waste disposal of the filter element, which consists of all sorts of different materials, and, on the other hand, that when the filter element is changed, at least the overflow valve is discarded because it is rigidly integrated in the end disk of the filter element.

A filter for liquids is known from U.S. Pat. No. 4,622,136 in connection with which a support part is supported in a separable filter housing, said support part receiving an annular filter element. Said annular filter element, which itself has to effect a separation between the crude and clean spaces by tightly resting against the support part, has to be pushed with its total length over the support part, which means damaging of the filter element and/or a weakening of the sealing effect cannot be excluded.

A lubricating oil filter with a separable housing is known from DE-OS 39 03 675, in connection with which a filter insert provided with face-side end disks is rigidly connected with the housing cover, the latter being screwable to the filter housing. With said design, however, no provision is made for a support part for receiving individual elements and extending at least partly centrally through the interior space of the filter element, from which support part the filter element is separable and thus exchangeable alone.

Therefore, the problem of the present invention is to find a filter for liquids with a constructionally simple structure in connection with which the filter element can be discarded as waste separately and in a way friendly to the environment, whereby the other functionally important individual parts can be reused.

The solution to said problem is obtained with a filter for liquids with the features according to the characterizing part of claim **1**.

Advantageous developments of the invention are contained in the dependent claims.

Exemplified embodiments according to the invention are shown in the drawing, in which:

FIG. **1** shows a sectional view of the filter for liquids according to the invention;

FIG. **2** shows a sectional view of a second embodiment of a filter for liquids according to the invention;

FIG. **3** shows a partially sectional view of a third embodiment of a filter for liquids according to the invention;

FIG. **4** shows a sectional view of a fourth embodiment of a filter for liquids according to the invention; and

FIG. **5** shows a sectional view of a fifth embodiment of a filter for liquids according to the invention.

A filter for liquids **1** according to FIG. **1** consists of a pot-shaped filter housing which, at its one end, is provided with the feed and discharge openings **3** and **4**, respectively, and connectable, for example with a mounting head, and at its other end closed by a removable housing cover **5**. Provision is made for a seal **6** between the screw-on housing cover **5** and the filter housing **2**. A filter element **7** made of paper is designed as a star filter and pocket-glued and separates the crude space from the clean space **9**. At each of its ends, it is provided on its inner circumference with a sleeve **10** made of strengthened paper. Furthermore, for stiffening the filter element **7**, provision is made for a sleeve **11** in the center zone of the filter element **7**. The manufacture of such a filter element from a single material assures that when the filter is changed, it can be discarded as waste in a way friendly to the environment.

In the filter housing, the filter element **7** is fixed by a sleeve-shaped support part **12** made of plastic, whereby the sleeves **10**, which are rigidly joined with the filter element **7**, rest against the seals **13**, **14**. The seal **13** is designed U-shaped and grips around the bottom end of the support part **12**, so that a sealing is obtained at the same time between the crude and clean spaces **8** and **9**, respectively, and the interior **15** of the support part. The ring-shaped seal **14** is supported in the top zone of the support part **12** in a matching groove **16**. The support part **12** consists of the two individual parts **12***a, b*, which are screwed to each other via a thread. In an intermediate wall **17** of the lower individual part **12***b* of the support part **12**, provision is made for a return check valve **18**, so that on the one hand, the purified lubricating oil can flow off via the discharge opening **4** only starting with a predetermined pressure, and, on the other hand, running dry of the filter is avoided when the internal combustion engine is standing still. In an intermediate wall **19** of the top individual part **12** a of the support part **12**, provision is made for an overflow valve **20**, which, at a corresponding pressure difference, established a connection between the interior **15** of the support part **12** and the crude space **8**. The top individual part **12***a* of the support part **12** has the openings **21**, which establish a connection between the clean space **9** and the interior **15** of the support part **12**. In addition, the individual part **12***a* can be engaged with the housing cover **5** via a snap connection **22**, so that the housing cover **5** is screwed off from the filter housing **2**, the filter element **7** is removed together with the support part **12**.

With such a filter for liquids, it is assured in a constructionally simple way that when the filter element is changed, it can be disposed of as waste in a way friendly to the environment because of the single material used, and that the individual parts such as the support part **12**, the valves **18**, **20**, and the seals **13**, **14**, which are required for the function, can be either reused or simply exchanged.

In the exemplified embodiment of a filter for liquids according to FIG. **2**, the same reference numerals are used as in FIG. **1** for identical parts. These are:

Filter 1 for liquids	
Filter housing 2	with screw-on housing cover 5
Feed opening 3	
Discharge opening 4	
Seal 6	
Filter element 7	
Crude space 8	
Clean space 9	
Sleeve 10	
Sleeve 11	

-continued

Filter 1 for liquids	
Support part 12	with the individual parts 12 a, b, which are connected with each other via a snap connection 31
Seal 14	
Interior 15	of the support part 12
Groove 16	for the seal 14
Intermediate wall 17	for receiving the return check valve 18
Intermediate wall 19	for receiving the overflow valve 10
Openings 21	for connecting the clean space 9 with the interior 15 of the support part 12.

The bottom individual part **12***b* of the support part **12**, which also receives a return check valve **18**, is designed differently as compared to the exemplified embodiment according to FIG. **1**, and has a groove **24** extending all around for receiving a seal **23**. The lower end of the individual part **12***b* changes into a disk **25** having the feed openings **3** and, via a seal **26**, rests against the filter housing **2**. A return check valve **27** closing the feed openings **3** is supported in the individual part **12***b* of the support part **12** as well.

The filter **1** for liquids is different from the exemplified embodiment according to FIG. **1** particularly in that a heat exchanger **28** (indicated only in rough outlines) is additionally integrated in the filter housing **2**, said heat exchanger being acted upon by the cooling water of the internal combustion engine, whereby the feed and discharge of the cooling water takes place via a sleeve-shaped connection part **30**, which is fitted with the short feed and discharge pipe **29** and rotatably supported (snap closure **31**) on the housing part **2**. For holding the heat exchanger **28**, a sleeve-shaped connection element **32** made of metal is screwed into filter housing **2**, which connection element, at its top end rests sealed against the individual part **12***b* of the support part **12**, and which, at its bottom end, has an inside thread **33** for connecting the filter **1** for liquids with the internal combustion engine via known means.

The properties and advantages stated with respect to the exemplified embodiment according to FIG. **1** apply to the exemplified embodiment according to FIG. **2** as well.

Another exemplified embodiment according to FIG. **3** contains a filter **40** for liquids which is designed as a primary/secondary flow filter. The filter **40** for liquids, which is arranged upright, contains a pot-shaped filter housing **41** made of aluminum pressure die-cast and a screw-on housing cover **42** made of plastic, between which provision is made for a seal **43**. At the closed end of the filter housing **41**, provision is made for feed and discharge ducts for the lubricating oil, whereby provision is made for a discharge duct **44** leading to the points of lubrication for the cleaned lubricating oil in the primary flow, and for a discharge duct **45** leading into the crank space for the cleaned lubricating oil in the secondary flow.

A primary-flow filter element **46** is made of paper (like the filter element according to FIGS. **1** and **2**) and designed in the form of a star filter with glued pockets, and at each of its ends rigidly connected on the inside by glueing with a sleeve **47** mde of strengthened paper.

A secondary-flow filter element **48** consists of stuffed cotton, which is received by an endless, ring-shaped hose **49** made of cotton. Since the two filter elements **46**, **48** each consist of single materials, they can be disposed of as waste in a simple way, also separately, in a manner friendly to the environment.

For holding the filter elements **46**, **48** in the interior of the filter housing **41**, provision is made for a support part **50** made of plastic, which consists of the individual parts **51**, **51***a*, **52**, **53**, which are manufactured by the injection molding process and welded or glued to each other. The individual part **51** consists of a central tube **54**, to which in its upper zone, an L-shaped sleeve **55** is shaped by molding in one piece in such a way that a clean space **58** for the cleaned lubricating oil of the secondary-flow filter element **48** is formed between the outer wall of the tube **54** and the longer leg **57** of the L-shaped sleeve **55**, said longer leg having the openings **56**. Said clean space **58** is connected with the interior **59** of the tube **54** via a throttle bore **60** disposed in the upper zone of the tube **54**, so that the upper zone of the tube **54** acts at the same time as a standpipe. At its lower open end, the tube **54** is sealingly supported in a short pipe **61** receiving the discharge duct **45** for the cleaned lubricating oil of the secondary-flow filter, whereby for receiving a return check valve **62**, the lower end of the tube **54** is divided in two parts and the individual part **51** a is connected with the individual part **51** via a snap connection **63**.

In order to obtain a ring-shaped pot part **64** for receiving the secondary-flow filter element **48**, the individual part **52** consists of a Z-shaped angle part **65** with legs of different length, of which angle part the one leg **66** is provided with the openings **67** and forms the outer wall of the ring-shaped pot part **64**, and of which the shorter leg **68** rests against the tube **54**, and of which the center bridge **69** rests against the short leg **70** of the L-shaped sleeve **55**, whereby said parts are welded to each other. A sleeve-shaped extension **71** is shaped by molding on the center bridge **69** as one piece, said extension being sealingly supported in a short pipe **72** of the filter housing **2** and serving for receiving the primary-flow filter element **46**, whereby the primary-flow filter element **46** rests via its sleeves **47** rests against the seals **73**, **74**, which are supported in matching grooves.

In order to close the ring-shaped pot part **64** receiving the secondary-flow filter and to prestress the secondary-flow filter element **48**, a cover **75** designed as a type of winged nut is screwed together with the upper zone of the individual part **51** of the support part **50**. Such termination and such prestress may be realized also, for example via a cover part with a spring and bayonet lock.

A snap device **76** mounted on the top end of the individual part **51** of the support part **50** engages in a matching counterpart **77** mounted on the housing cover **42**, so that when the housing cover **42** is removed, the support part **50** together with the filter elements **46**, **48** is removed at the same time. With this, the individual part **51** a engaging the short pipes **61**, **72** and the sleeve-shaped extension **71** control the discharge ducts **44**, **45** open, so that the oil present in the filter can drain off.

With other exemplified embodiments of a filter for liquids according to FIGS. **4** and **5**, the same reference numerals as in FIGS. **1** and **2**, respectively, are used for identical parts.

A star-shaped filter element **78** manufactured from paper is provided at each of its ends on its inner circumference with a sleeve **79** made of strengthened paper, on which a paper end disk **80** is shaped by molding in one piece, sealingly closing the axial face edges of the filter element **78**. By manufacturing such a filter element from a single material, it is assured that said element can be disposed of as waste in an environment-friendly way when the filter is changed.

For receiving a part of the individual elements, a support part **81** is fixed on the housing cover **5** by means of the snap connection **82**. A first radial seal **83** separating the crude space **8** from the clean space **9** is supported on the support part **81**, whereby, for example, an extension **84** engages in a groove of the support part **81**. In an intermediate wall **85**

of the support part **81**, an overflow valve **20** is provided which, at a corresponding pressure difference, establishes a connection between the crude space **8** and the clean space **9**. In the interior of the support part **81**, additional provision can be made for a sieve **86**. Furthermore, for supporting the filter element **78**, axially extending support ribs **87** are shaped by molding on the support part **81**, distributed over the outer circumference of the support part.

For receiving a second radial seal **88** separating the crude space **8** from the clean space **9**, a tubular short pipe **89** projecting into the interior of the filter for liquids is molded as one piece onto the filter housing **2** in the center. Via the sealing lips **90** molded onto said radial seal **88**, the latter can rest against the sleeve **79** arranged on the filter element **78**. Furthermore, a return check valve **91** blocking the feed opening **3** can be joined with the radial seal **88**, forming one piece with the latter. The return check valve **91** can be additionally elastically prestressed, for example via a spring metal sheet plate supported in the short pipe **89**. In order to prevent the clean space **9** from running dry during an operational standstill, a return check valve **92** is fastened on the short pipe **89**, whereby its ring disk **93** is provided with the tongues **94**, the latter being distributed over the circumference and serving for securing the position of the radial seal **88**.

The difference between FIG. **4** and FIG. **5** is that in FIG. **5**, the snap connection **82** is designed to be releasable. The filter of FIG. **5** contains sieve **86**.

The releasable snap connection between the housing cover **5** and the support part **81** comprises the four hook-shaped lugs **95**, which are circumferentially evenly distributed on the inner bottom of the cover and which project into the interior of the housing and engage in matching, closed recesses **96** of the support part **81**, said recesses being provided at that end of support part **81** that faces the cover **5**. After the lugs **95** have snapped in, a cam **97** of each lug **95** rests with its sharp edge against a sharp-edged clawing side **99** of the recess **96** in the locking direction, so that an unintentional detachment of the support part **81** from the housing cover **5** is impossible even under extreme pressure conditions in the interior of the filter. The other three sides of the recess **96** may be provided in the releasing direction with the bevelled surfaces **100** depending on which type of release (turning or axial displacement) is intended. At the top end **101** of the support part **81**, the recesses **96** are molded in in such a way that a ring **102**, the latter extending all around, is still present on the support part **81**.

When the cover **5** and the support part **81** are mounted, the support part **81** is pushed with its ring **102** over a molded incline **103** of the hook-shaped lugs **95** in the direction of the bottom of the cover in such a way that the cams **97** of the lugs **95** subsequently lock in the recesses **96**.

When the cover **5** and the support part **81** are dismantled, the support part **81** is first pushed in the direction of the cover **5**, so that the cams **97** of the lugs **95** are guided across the bevelled surfaces **100** of the recesses **96** and come to rest on the inside against the end **101** of the support part **81**. Subsequently, the support part **81** is turned to such an extent that when the support part **81** is subsequently pulled off, the lugs **95** will slide across the guide bridges **104**, the latter being disposed between the recesses **96** and connecting the end **101** of the support part **81** with the ring **102** of the support part **81**, without locking in the recesses **96**.

With the shown exemplified embodiment of such a filter for liquids, a separate and environmentally friendly waste disposal is assured when the filter is changed due to the utilization of single materials for the individual filter elements.

Furthermore, the special constructional embodiment of the support part receiving the functionally required individual parts assures that the exchangeability and/or reuse of each individual part is possible, i.e., for example, the support part can be completely exchanged or reused, only the seals and/or the filter elements can be replaced separately, or the valuable filter housing can be reused per se because no other individual parts (wear parts) are rigidly integrated in said housing. Such a design of the filter for liquids permits a use according to the unit construction system, so that it is even possible to omit, for example the one or other valve without any further measures.

We claim:

1. Filter for liquids, comprising

a filter housing including an inlet means and an outlet means, a cover separable from said housing, said housing containing at least one ring-shaped, exchangeable filter element separable from said housing having two axial ends and having an interior space, each said axial end defining an inside and a face side;

a support part within said housing, said support part being separable from the at least one filter element and extending at least partly centrally through the interior space of the filter element, and said support part being supported on the cover by a support means;

first and second radial inner seals separating a crude space surrounding an exterior of said filter element from a clean space contained with the interior space of the filter element, and said radial inner seals mounted within said filter element at the axial ends of the filter element;

said separable filter element being folded star-shaped and sealed on each said face side by an end disk and provided on the inside at each of its two axial ends with a sleeve having a radial inner surface for resting against a radial outer surface the radial inner seals;

said radial inner seals comprising said first radial seal positioned on the support part for separating the crude space from the clean space and said second radial inner seal positioned on said outlet means; and

an overflow valve contained within the support part for establishing a flow connection between said crude space and said interior space when a pressure difference therebetween exceeds a predetermined value.

2. Filter for liquids according to claim **1**, further comprising a sieve contained within the support part.

3. Filter for liquids according to claim **1**, further comprising

an axially extending longitudinal axis in said support part;

circumferentially distributed, axially extending support ribs extending along said longitudinal axis and molded on an exterior surface of the support part for supporting the filter element.

4. Filter for liquids according to claim **1**, further comprising

wherein said outlet means comprises a tubular short pipe projecting into the interior Space of the filter element said pipe being centrally shaped by molding on the filter housing for receiving said second radial inner seal separating the crude space from the clean space.

5. Filter for liquids according to claim **4**,

wherein said second radial inner seal lips extending all around said second radial seal.

6. Filter for liquids according to claim **4**, wherein said housing has feed openings, and wherein there is a return

check valve for closing the feed openings, said return check valve including a portion that rests against the short pipe on the outside, whereby said return check valve prevents flow out of said crude space via said feed openings.

7. Filter for liquids according to claim **6**, wherein said portion of the return check valve includes the second radial inner seal.

8. Filter for liquids according to claim **4**, further comprising a return check valve within said short pipe for preventing flow into said interior space via said pipe.

9. Filter for liquids according to claim **1**, further comprising

housing cover for the filter housing, and

wherein said support means includes a releasable snap connection means on the support part for detachably connecting the housing cover to the support part.

10. Filter for liquids according to claim **9**, wherein the releasable snap connection means comprises:

at least two flexible, hook-shaped lugs on the housing cover; and

means defining closed recesses on support part which engage said lugs;

each means defining a closed recess has in a locking direction at least one sharp-edged clawing side means;

each means defining a closed recess has a bevelled surface and each lug has in a direction of release at least one molded incline; and

guide bridge means for the lugs are circumferentially disposed between the recesses.

11. Filter for liquids according to claim **10**,

wherein said housing cover has an inner bottom;

said hook-shaped lugs projecting on the cover inner bottom into the interior of the housing engage in said closed recesses in the support part at the end of the support part facing the cover;

said lugs each having a cam having a sharp edge, whereby the cams of the lugs in each case rest with their sharp edge in the locking direction against the sharp-edge clawing side means of each recess.

12. Filter for liquids according to claim **10**,

wherein there are four circumferentially distributed lugs.

13. Filter for liquids according to claim **1**, further comprising:

wherein said outlet means comprises a tubular short pipe projecting into the interior space of the filter element, said pipe being centrally shaped by molding on the filter housing for receiving said second radial inner seal separating the crude space from the clean space; and

wherein said support means includes means for detachably connecting the housing to the support part.

14. Filter for liquids according to claim **1**, further comprising

a housing cover for the filter housing

wherein said support means includes means for detachably connecting the housing cover to the support part,

a tubular short pipe projecting into the interior space of the filter element, and

a return check valve within said short pipe for preventing flow into said interior space via said pipe.

15. Filter for liquids according to claim **1**, further comprising

wherein said outlet means comprises a tubular short pipe projecting into the interior space of the filter element, said pipe being centrally shaped by molding on the filter housing for receiving said second radial inner seal separating the crude space from the clean space; and,

wherein said support means includes a releasable snap connection means on the support part for detachably connecting the housing cover to the support part.

16. Filter for liquids according to claim **15**, further comprising a return check valve within said short pipe for preventing flow into said interior space via said pipe.

17. Filter for liquids, comprising

a filter housing including an inlet means and an outlet means, a cover separable from said housing, said housing containing at least one ring-shaped, exchangeable filter element separable from said housing having two axial ends and having an interior space, each said axial end defining an inside and a face side;

a support part within said housing, said support part being separable from the at least one filter element and extending at least partly centrally through the interior space of the filter element, and said support part being supported on the cover by a support means;

first and second radial inner seals separating a crude space surrounding an exterior of said filter element from a clean space contained with the interior space of the filter element, and said radial inner seals mounted within said filter element at the axial ends of the filter element;

said separable filter element being folded star-shaped and sealed on each said face side by an end disk and provided on the inside at each of its two axial ends with a sleeve having a radial inner surface for resting against a radial outer surface the radial inner seals;

said radial inner seals comprising said first radial seal positioned on the support part for separating the crude space from the clean space and said second radial inner seal positioned on said outlet means; and

an overflow valve contained within the support part for establishing a flow connection between said crude space and said interior Space when a pressure difference therebetween exceeds a predetermined value;

wherein said outlet means comprises a tubular short pipe projecting into the interior space of the filter element, said pipe being centrally shaped by molding on the filter housing for receiving said second radial inner seal separating the crude space from the clean space; and

a return check valve within said short pipe for preventing flow into said interior space via said pipe.

18. Filter for liquids, comprising

a filter housing including an inlet means and an outlet means, a cover separable from said housing, said housing containing at least one ring-shaped, exchangeable filter element separable from said housing having two axial ends and having an interior space, each said axial end defining an inside and a face side;

a support part within said housing, said support part being separable from the at least one filter element and extending at least partly centrally through the interior space of the filter element, and said support part being supported on the cover by a support means;

first and second radial inner seals separating a crude space surrounding an exterior of said filter element from a clean space contained with the interior space of the filter element, and said radial inner seals mounted within said filter element at the axial ends of the filter element;

said separable filter element being folded star-shaped and sealed on each said face side by an end disk and

provided on the inside at each of its two axial ends with a sleeve having a radial inner surface for resting against a radial outer surface the radial inner seals;

said radial inner seals comprising said first radial seal positioned on the support part for separating the crude space from the clean space and said second radial inner seal positioned on said outlet means; and

an overflow valve contained within the support part for establishing a flow connection between said crude space and said interior space when a pressure difference therebetween exceeds a predetermined value; and

wherein said support means includes means for detachably connecting the housing cover to the support part.

19. Filter for liquids, comprising

a filter housing including an inlet means and an outlet means a cover separable from said housing, said housing containing at least one ring-shaped, exchangeable filter element separable from said housing having two axial ends and having an interior space, each said axial end defining an inside and a face side;

a support pare within said housing, said support part being separable from the at least one filter element and extending at least partly centrally through the interior space of the filter element, and said support part being supported on the by a support means;

first and second radial inner seals separating a crude space surrounding an exterior of said filter element from a clean space contained with the interior Space of the filter element, and said radial inner seals mounted within said filter element at the axial ends of the filter element;

said separable filter element being folded star-shaped and sealed on each said face side by an end disk and provided on the inside at each of its two axial ends with a sleeve having a radial inner surface for resting against a radial outer surface the radial inner seals;

said radial inner seals comprising said first radial seal positioned on the support part for separating the crude space from the clean space and said second radial inner seal positioned on said outlet means; and

an overflow valve contained within the support part for establishing a flow connection between said crude space and said interior space when a pressure difference therebetween exceeds a predetermine value;

wherein said outlet means comprises a tubular short pipe projecting into the interior space of the filter element, said pipe being centrally shaped by molding on the filter housing for receiving said second radial inner seal separating the crude space from the clean space; and

a return check valve within said short pipe for preventing flow into said interior space via said pipe; and,

wherein said support means includes means for detachably connecting the housing cover to the support part.

20. Filter for liquids, comprising

a filter housing including an inlet means and an outlet means, a cover Separable from said housing, said housing containing at least one ring-shaped, exchangeable filter element separable from said housing having two axial ends and having an interior space, each said axial end defining an inside and a face side;

a support part within said housing, said support part being separable from the at least one filter element and extending at least partly centrally through the interior space of the filter element, and said support part being supported on the cover by a support means;

first and second radial inner seals separating a crude space surrounding an exterior of said filter element from a clean space contained with the interior Space of the filter element, and said radial inner seals mounted within said filter element at the axial ends of the filter element;

said separable filter element being folded star-shaped and sealed on each said face side by an end disk and provided on the inside at each of its two axial ends with a sleeve having a radial inner surface for resting against a radial outer surface the radial inner seals;

said radial inner seals comprising said first radial seal positioned on the support part for separating the crude space from the clean space and said second radial inner seal positioned on said outlet means; and

an overflow valve contained within the support part for establishing a flow connection between said crude space and said interior space when a pressure difference therebetween exceeds a predetermined value; and,

wherein said support means includes a releasable snap connection means on the support part for detachably connecting the housing cover to the support part.

21. Filter for liquids, comprising

a filter housing including an inlet means and an outlet means, a cover separable from said housing, said housing containing at least one ring-shaped, exchangeable filter element separable from said housing having two axial ends and having an interior space, each said axial end defining an inside and a face side;

a support part within said housing, said support part being separable from the at least one filter element and extending at least partly centrally through the interior space of the filter element, and said support part being supported on the cover by a support means;

first and second radial inner seals separating a crude space surrounding an exterior of said filter element from a clean space contained with interior space of the filter element, and said radial inner seals mounted within said filter element at the axial ends of the filter element;

said separable filter element being folded star-shaped and sealed on each said face side by an end disk and provided on the inside at each of its two axial ends with a sleeve having a radial inner surface for resting against a radial outer surface the radial inner seals;

said radial inner seals comprising said first radial seal positioned on the support part for separating the crude space from the clean space and said second radial inner seal positioned on said outlet means; and

an overflow valve contained within the support part for establishing a flow connection between said crude space and said interior space when a pressure difference therebetween exceeds a predetermined value;

wherein said outlet means comprises a tubular short pipe projecting into the interior space of the filter element, said pipe being centrally shaped by molding on the filter housing for receiving said second radial inner seal separating the crude space from the clean space;

a return check valve within said short pipe for preventing flow into said interior space via said pipe; and,

wherein said support means includes a releasable snap connection means on the support part for detachably connecting the housing cover to the support part.

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